CORE

The Voice of Mineral Exploration/Spring-Summer 2013

IN CONVERSATION WITH THE HONOURABLE TONY CLEMENT

TMX GROUP: DRIVING CANADA'S MINERAL EXPLORATION AND MINING INDUSTRY

GREEN TECHNOLOGY: CHANGING THE WAY WE DO BUSINESS

PDAC 2013 Convention: Where the world's mineral industry meets

PDAC
PROSPECTORS & DEVELOPERS ASSOCIATION OF CANADA

CORE

The Voice of Mineral Exploration
Spring-Summer 2013

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Editorial
Produced by PDAC's Communications Department

EDITOR
Cameron Ainsworth-Vincze

CONTRIBUTORS
Glenn Nolan, Ross Gallinger, Lisa McDonald, Nadim Kara, Steve Virtue, Karla Doig, Sherry Dickert, Florence MacLeod, Elizabeth Hames, Virginia Heffernan, Ian G. Mason

DESIGN
Hambly & Woolley Inc.

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A vision for our future: The PDAC's new strategic plan

To put it mildly, it's been a busy year for the PDAC staff and board of directors.

From hosting the industry's largest annual convention in early March and launching a new visual identity, to continually expanding our program areas and creating new resources that enable our members to succeed in the field every day, we have been working overtime to ensure that Canada's mineral exploration and development industry remains a global powerhouse.

To build on this momentum, the PDAC has developed a new strategic plan for the association that will further enhance our ability to protect and promote the interests of our members for the next decade and beyond. In putting the plan together, the goal wasn't to simply deliver a new strategy, but to create a new imperative for the organization that emphasizes our position as the leading voice for the mineral exploration community—both in Canada and around the world.

We started developing the plan back in 2011 through a well-designed process that included several workshops, interviews with stakeholders, and feedback from a member survey that provided rich insights from some 1,000 participants. We then analyzed that information and spent numerous hours discussing and evaluating each issue, then prioritizing and examining the breadth of each issue and its implications.

With the assistance of facilitators and staff, the board of directors narrowed in on three major business imperatives—access to capital, access to land, and Aboriginal affairs—that are paramount to the success of our members and the sector. Access to capital is without question a timely issue, one that includes the securities regime and tax measures that go a long way in providing stability for our industry. Access to land goes without saying—without it, our members simply can't work. And building stronger relationships with Aboriginal communities and helping to provide the necessary tools and support they need to benefit from projects remains a top priority.

Identifying these three business imperatives is just the start, however, and will be complemented by the expansion of other key areas, such us our CSR program, student initiatives, communications and public affairs, and of course of world-renowned convention. The next step, which is well underway, is to build roadmaps that will identify what needs to be done to make our vision a reality, and that will enable us to support the membership of the PDAC well into the 21st century.

Glenn Nolan, President
Prospectors & Developers Association of Canada

Changing the way we tell our story

One of the biggest highlights from the PDAC 2013 Convention for me was the unveiling of our new brand, which featured a new logo, the launch of our association's first Annual Report, and the redesign of our website.

Our new brand, expressed through the many ways we communicate—our convention, our programs, our print and online materials, our public and government relations initiatives, and our visual identity—is in many ways the essence of how we tell our story to the world, and bring it to life.

To further understand our story, we spoke with industry leaders, representatives from NGOs, government and the media, and conducted an online survey to gather input from our members. What we discovered is that perceptions about the role and importance of the PDAC are changing. Although many people associate the PDAC with our world-famous convention, the growth and success of our programs and advocacy work has solidified the PDAC's status as the face of mineral exploration and development in Canada.

In analyzing the wide range of research and insights that we received, five main characteristics emerged about what we do and who we are as an association:

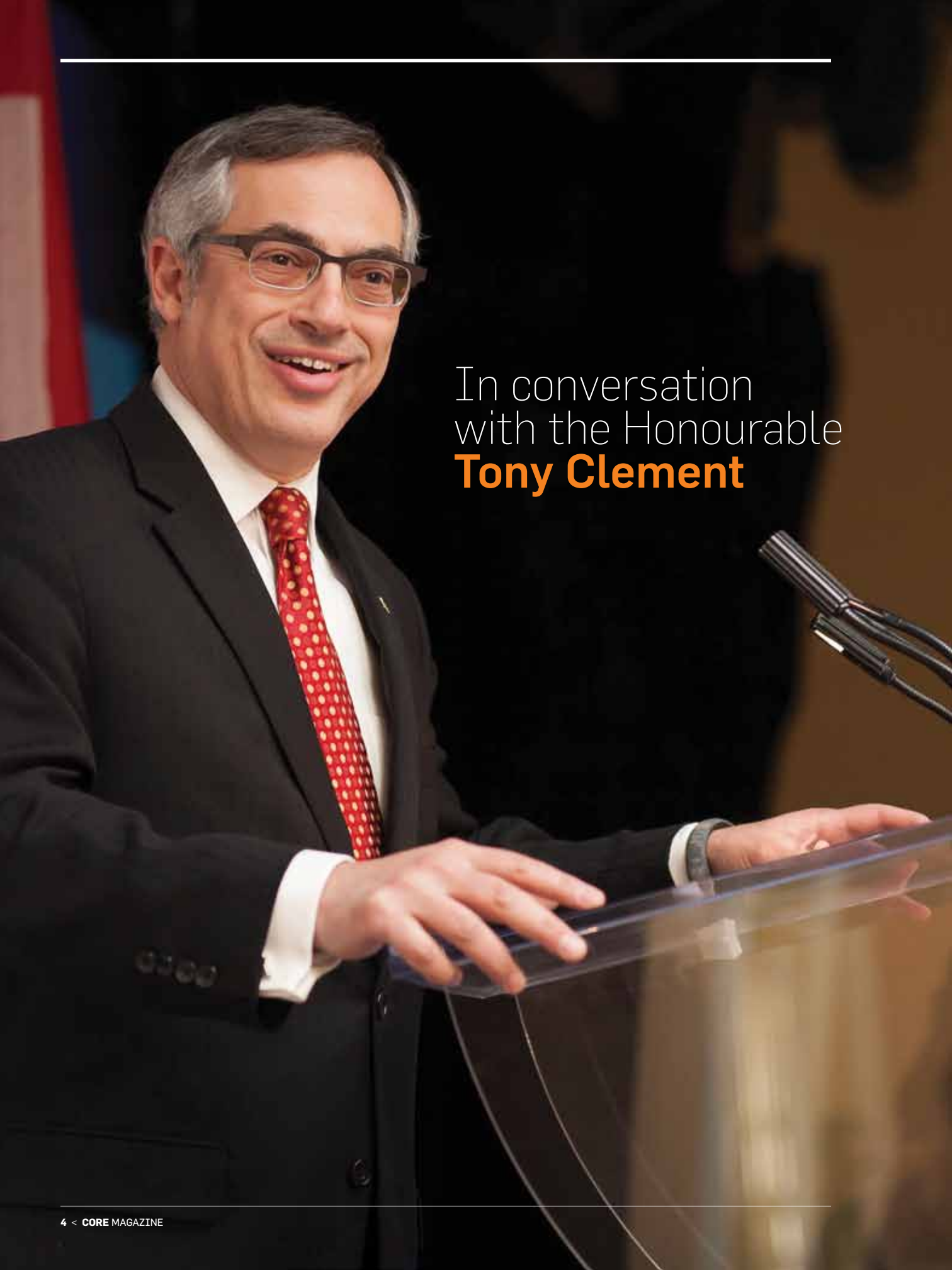
- We are **passionate** about what we do;
- We are **professionals** in a science and technology-based industry;
- We are **stewards** of resources and communities;
- We are **bold and optimistic**;
- We embrace **challenges and change**.

To demonstrate these characteristics, our brand launch included the creation of a new logo and the redesign of various communications resources. To further improve our publications, we have now taken our quarterly newsletter *In Brief* and redesigned and renamed it into a magazine called the *Core*, which you are now reading. Through the *Core* we will continue to deliver relevant and timely information as it relates to the activities of the PDAC and the industry, and will be going above and beyond to provide intriguing content to inform you about the technologies, personalities and trends that are shaping the mineral exploration and development industry.

It promises to be a platform that will be of interest to a variety of readers, while also showcasing the important role our industry plays in the current and future prosperity of this great country.

I hope you enjoy our first issue of the *Core*!

Ross Gallinger, Executive Director
Prospectors & Developers
Association of Canada



In conversation with the Honourable **Tony Clement**

Q&A

On the heels of attending the PDAC 2013 Convention, the Honourable Tony Clement shares his vision for developing Northern Ontario

Q. Can you briefly explain what the goals and parameters are for your new role as the federal Lead Minister responsible for Ontario's Ring of Fire, and can you outline what role the Federal Government has committed to undertake in the region?

A. I have two distinct roles in Northern Ontario: the federal Lead Minister for the Ring of Fire, a recent nomination, and Minister for FedNor, a post I have proudly held since 2006. Although they are both related to the economic development of Northern Ontario, my duties and responsibilities for both roles are different.

On the Ring of Fire, I was recently asked by the Prime Minister to coordinate and lead our Government's engagement on this important file. Our Government recognizes that the Ring of Fire represents a generational opportunity to support job creation and economic growth throughout Northern Ontario and beyond. Given the Ring of Fire's size and significance we also understand that it requires a coordinated, whole-of-government approach to the process. That is why I am working closely with my colleagues at Aboriginal Affairs, at Industry, at Natural Resources, and at 12 other federal departments in order to ensure we speak with a single voice with all partners and stakeholders involved in this development.

As for FedNor (Federal Economic Development Initiative for Northern Ontario), I am proud to be the longest serving Minister for FedNor. Since 2006, FedNor has supported more than 1,500 projects throughout Northern Ontario, representing $358 million in investment mostly through two main programs—the flagship Northern Ontario Development Program (NODP) and the administration of the Community Futures (CF) Program in Northern Ontario, which supports 24 Community Futures Development Corporations (CFDCs).

The NODP invests in projects that support community economic development, business growth and competitiveness, and innovation. The CFDCs are local not-for-profit organizations that provide access to capital for community-based projects, small and medium-sized businesses and social enterprises.

As mentioned, both roles support the economic development of Northern Ontario in different manners although both have the economic prosperity of the region as their main objective.

Q. Ontario's Ring of Fire is of substantial economic importance to the province and the country. What is the expectation and forecast for growth in the region, specifically as it relates to mineral exploration and mining?

A. The Ring of Fire could very well be the largest mining development Northern Ontario has ever seen. A vast 5,120 square km area in Ontario's Far North, it is estimated to contain $30 to $50 billion worth of minerals, including nickel, copper and the largest chromite deposit in North America, the main ingredient in stainless steel. To date, there are 30,000 claims covering the area with approximately 30 companies actively exploring the region spending close to $300 million to date.

The Ring of Fire will, without question, be a significant catalyst for regional economic and social development. In terms of jobs alone it is expected to generate 5,000 direct and indirect positions in Northern Ontario in addition to significant spinoff benefits throughout the province and beyond.

Q&A

"PDAC is not only a premier mining event but an essential economic forum to discuss Canada's economic future through responsible development."

— THE HONOURABLE TONY CLEMENT

CLOCKWISE FROM TOP LEFT:
PDAC Executive Director Ross Gallinger, the Honourable Tony Clement, the Honourable Peter Kent (Minister of the Environment), and PDAC President Glenn Nolan; Tony Clement speaking at the PDAC 2013 Media Reception at the Fairmont Royal York; Tony Clement and Elsie MacDonald, Band Councillor with Webequie First Nation; Tony Clement chatting with convention attendees.

BIOGRAPHY

The Honourable Tony Clement is President of the Treasury Board and Minister for the Federal Economic Development Initiative for Northern Ontario.

Tony Clement was first elected to the House of Commons in 2006 and re-elected in 2008 and 2011. In February 2006, he was appointed Minister of Health and Minister for the Federal Economic Development Initiative for Northern Ontario. In October 2008 he was appointed Minister of Industry.

Prior to running for federal office, Mr. Clement was a member of Ontario's provincial legislature from 1995 to 2003, representing Brampton South (later, Brampton West-Mississauga). He served as Minister of Transportation, Minister of the Environment, Minister of Municipal Affairs and Housing, and Minister of Health and Long-Term Care. Prior to his election he was counsel to a national law firm.

He holds a bachelor of arts in political science and a law degree from the University of Toronto.

Q&A

Q. The PDAC has long advocated for the full participation of Aboriginal communities in the development of economic opportunities and the Ring of Fire represents a substantial opportunity for the communities in Northern Ontario. How is Government going to improve engagement between community and industry, and promote mutually beneficial partnerships?

A. As I said in my speech at the PDAC 2013 Convention in March: Every geologist and miner worth his salt knows that you have to get a proper lay of the land if you are going to strike that elusive vein. That goes just as much for the people living on the land as the geology below it.

There is no question Aboriginal communities must be part of the evolution of this development. That is why the first visit I made as Lead Minister on the Ring of Fire was to meet with representatives of the Matawa First Nations in Thunder Bay last February. I will be meeting with them again shortly. Our Government is fully committed to working closely with these communities in the coming months and years, reaffirming our commitment to collaborative and responsible resource development.

Engaging Aboriginal communities early and consistently has achieved great success for companies in terms of the social and economic benefits their projects have generated. There are numerous examples of successful partnerships between mining companies and First Nations communities across Canada. Impact and Benefit Agreements or IBAs, for example, which include economic incentives, employment and education opportunities, have been negotiated for the Voisey's Bay project in Newfoundland, where 54% of the workforce comes from local First Nations communities and Goldcorp's Musselwhite mine, which is not far from the Ring of Fire. There are approximately 90 such agreements in Northern Ontario alone.

Through Economic Action Plan 2013, our Government is committing $4.4 million to the Ring of Fire Capacity Building Initiative. The initiative aims to support First Nations in benefiting fully from the economic and business development opportunities made possible through the Ring of Fire. It will provide services such as business skills development, strategic business planning, and Aboriginal youth engagement.

Q. Many of our members operating in the region have felt that the development in the Ring of Fire has been unnecessarily slowed for one reason or another. How will your role work to help our members operating or looking to operate in the region?

A. As mentioned previously, our Government recognizes that this development is too important to allow it to become mired in paralysis and uncertainty. That is why it is important to speak with one voice when dealing with communities, the Government of Ontario, stakeholders and industry. Within the Federal Government alone, there are 15 departments and agencies involved in the Ring of Fire. As Lead Minister, I will be able to coordinate our Government's approach to the process. This collaboration will ensure we maximize investments, avoid duplication and work efficiently in addressing development challenges and potential issues.

Q. You recently attended the PDAC Convention for the first time. What was your impression of the event and what did you take away from the experience?

A. The sheer size of the convention was impressive. Thirty-thousand visitors from over 125 countries is a testament to the importance of mining to the global economy, but also to Canada's role in the world mining industry. Given its size and the quality of the participants, PDAC is not only a premier mining event but an essential economic forum to discuss Canada's economic future through responsible development. The impressive opportunity for participants to network makes this convention a can't miss event. I wish to once again thank the organizers for inviting me and providing me the opportunity to address the convention. **c**

INSIDE THE PDAC 2013 CONVENTION

For the second year in a row the Prospectors & Developers Association of Canada's International Convention, Trade Show & Investors Exchange in downtown Toronto attracted more than 30,000 delegates from 125 countries.

Bringing together an array of participants, from analysts, bankers, brokers and geo-scientists, to financiers, exploration managers and mining executives, this year's convention also included more than 1,600 students, 50 Canadian federal officials, and 400 accredited members of the media. They came from as far and wide as Madagascar, New Zealand, Singapore and the Faroe Islands to take part in the PDAC's 81st Annual Convention, which since 1932 has been the premier, must-attend convention for the mineral exploration and mining industry.

"People continually tell us that the PDAC Convention is like the Oscars or Super Bowl event for our sector," says PDAC President Glenn Nolan, who oversaw his first convention since becoming president last year. "Yet the number of people who attend is only one part of its success. The PDAC Convention is a place for people to share ideas about the challenges and opportunities that they face in the field every day, to examine new technologies that will improve their ability to succeed, and to strengthen relationships between industry partners and communities in Canada and around the world."

PDAC 2013 began with a record number of Short Courses (15) prior to the official start that covered a range of topics, such as land management in Canada and the untapped mineral potential of Europe, while

the 22 Technical Sessions during the convention examined everything from diamonds in the Arctic, to land access challenges and solutions, as well as the financing opportunities available in a volatile market.

A number of high-profile names were on hand to deliver several keynote speeches. The Honourable Tony Clement, President of the Treasury Board and Minister for the Federal Economic Development Initiative for Northern Ontario (FedNor), kicked off the convention at the Media Reception where he spoke about the economic opportunities available in Northern Ontario and the importance of fostering and nurturing positive relationships with northern communities.

The Honourable Joe Oliver, Canada's Minister of Natural Resources, joined PDAC President Glenn Nolan and Elder Alex Jacobs from Whitefish Lake First Nation to officially welcome delegates at the Opening Ceremonies, while Perrin Beatty, President and CEO of the Canadian Chamber of Commerce, spoke at the Innovation Luncheon about how Canada has transformed its resource endowment into a global competitive advantage. And to top it all off, more than 40 federal officials, including one Senator and six Ministers, participated in MP Day—the highest number of elected officials ever to attend the convention.

"Having the country's leading government officials and industry experts come and speak at our convention is an incredible opportunity for the attendees and our members to gain valuable insight into the economic issues and social trends that are driving our sector," says PDAC Executive Director Ross Gallinger. "We tailor our workshops, courses, panels and sessions every year to highlight the most important challenges and opportunities that are shaping the mineral exploration and mining sector, and in doing so the convention is a great venue to learn from these leading figures and exchange ideas about how the industry can flourish going forward."

For the fourth year in a row, the PDAC Convention included a Corporate Social Responsibility Event Series. Highlights from this year's series were the annual CEO Panel, along with a session entitled *CSR: Is it worth it?* that offered different perspectives on the business value of social investments from company and community representatives working on projects in Canada and Africa. In addition, the series featured a session called *Managing shifting sands: How to reduce operational risk through strategic alliances* where Coeur d'Alene Mines Corp. shared their story of operating a silver mine within a UNESCO World Heritage Site in Bolivia. And for the first time the series included a closing reception to provide CSR practitioners the chance to network and discuss what they learned over the three-day CSR Event Series.

This year's convention also attracted 600 self-identified Aboriginal delegates from across Canada—a record number. Many took part in the Aboriginal Program that is designed to bring Aboriginal communities and companies together with the mineral industry to share experiences and forge partnerships. One of the highlights of the program was the *Aboriginal Forum: Promoting excellence in engagement* that featured presentations on current topics related to Aboriginal affairs, consultation with Métis groups, and the launch of the revised "Mineral Exploration and Mining Guide for Aboriginal Communities."

For President Glenn Nolan, the association's first Aboriginal president, the PDAC Convention further underscores the PDAC's commitment to bringing communities together with industry to build a better Canada. "I am optimistic and excited that our sector and communities are coming together. It's an exciting time, and the PDAC Convention is where you see the future promise of our industry come to life. It's a future I look forward to being part of." c

HOTELS
Reservations open on June 26 at 11:00 am (EDT) for the PDAC 2014 Convention. A list of participating hotels, and their PDAC preferred rates, will be posted to the Hotels page of the convention website on June 14th. Book your room early to avoid disappointment!

EXHIBIT RENEWALS
NEW FOR 2014 – Priority Renewal application forms will be processed before New Exhibitor application forms are available. With this change, booth assignments will be confirmed earlier for PDAC 2014.

PRIORITY RENEWAL EXHIBITORS
Priority Renewal application forms and floor plans will be available July 11 at 10 am (EDT) on the convention website. Renewing exhibitors have priority renewal over the exhibit space they occupied at PDAC 2013. The priority renewal deadline is August 16. After this date, un-renewed booth space will be opened to New Exhibitors. Apply early to renew your space!

NEW EXHIBITORS
New Exhibitor application forms will be available on the convention website starting August 22 at 10 am (EDT). Once priority renewal assignments have been completed, all unrenewed exhibit space is assigned to New Exhibitors on a first-come, first-served basis. Submit your application form early!

All booth assignments will be confirmed after October 7 via email.

PDAC 2013 CONVENTION STATISTICS

GENERAL INFORMATION

Total number of convention attendees

30,147

Percentage of international attendees **25%**
Outside Canada the largest number of attendees came from: **United States, Australia, Peru, Mexico, England, China, Brazil, Chile, Argentina, South Africa and Turkey**
Number of countries represented **126**
Number of student delegates **1,666**
Number of Aboriginal delegates **600**
Number of accredited media **398**
Number of sponsors **69**

TRADE SHOW

Total number of booths

668

Total number of exhibiting organizations **418**
Number of governments exhibiting **60** (provincial, federal, international)

INVESTORS EXCHANGE

Total number of booths **613**
Total number of exhibiting organizations **580**

CORE SHACK

Total number of exhibiting companies **60**

PRESENTATIONS AND WORKSHOPS

Total number of Technical Sessions **22**
Total number of Short Courses/ Workshops **15**
Total number of Presentation Rooms **26**
Total number of Corporate Presentation Forum for Investors presentations **116**
Total number of Innovation Forum organized by CAMESE presentations **23**
Total number of speakers

506

CANADIAN GOVERNMENT REPRESENTATION

Total number of Federal Officials **53**
Total number of Elected Federal Officials **50**

MOBI STATS

20,904 visits to Mobi site

154,404
pages viewed

PDAC 2013 →

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Overcoming the capital crisis crunch

BY NADIM KARA

Zombie motifs abound in popular culture today, so it's no surprise that newsletter writer John Kaiser entitled a recent presentation on the exploration industry *Visualizing an alternative to zombie land*. As of April 4, 2013, almost 700 of the 1,800 TMX-listed companies he tracks had less than $200,000 of working capital, barely enough to keep the lights on let alone run a meaningful exploration program. Fifty per cent of these 'walking dead' were also trading at less than 10 cents, lending credence to his use of the post-apocalyptic metaphor.

These financial woes are rooted in global economic uncertainty, as manifested in the Eurozone crisis and slowing growth in China, which has led investors to seek the haven of liquidity—in zombie land, cash is truly king.

Institutional investors, no longer confident that the 'super-cycle' will continue to buoy commodity prices, have retreated, and the risk of tolerance of retail investors has dropped faster than the stock prices of many juniors. Senior mining companies that might traditionally have provided financing to juniors during a downturn are caught up in their own woes, conserving cash to cover higher costs at existing mines or coping with write-downs of overpriced assets acquired in better times.

It's not all doom and gloom, however. A number of high-profile investors are salivating at the prospect of acquiring equity stakes in beaten up juniors whose stock prices may not reflect their underlying value. As Ned Goodman said in a recent BNN interview taped during the PDAC 2013 Convention: "There's a lot of good things to put money into... it's a time to be buying."

Yet when money does flow into the sector, it is primarily seeking out advanced exploration projects with solid assets and good management, while shunning grassroots exploration. Without grassroots discoveries, there are no new mines, however, meaning that the motor that generates economic benefits for all Canadians—whether they live in rural and Aboriginal communities or downtown Toronto and Vancouver—may begin to stall.

While some analysts argue that there needs to be a 'culling' of the 'zombies', others worry that there may be a perfect storm emerging that will destroy Canada's unique and vital mineral exploration ecosystem.

In response to the concerns of its members, in December 2012 the board of directors of the PDAC struck an ad hoc Capital Crisis committee. Chaired by MaryAnn Mihychuk, the committee identified a number of solutions to facilitate capital-raising and enhance the viability of exploration companies to weather the storm. The PDAC will use the ideas generated through this process as the basis for its advocacy activities, starting with the 2013 Mines Ministers Conference in Yellowknife in September.

Over the spring and summer of 2013, PDAC will be organizing roundtable discussions with its members to create an opportunity for them to share their ideas on how to support the industry though this crisis. To participate in these sessions, and help the industry escape from zombie land, you can contact me directly at nkara@pdac.ca. **c**

Nadim Kara is the Senior Director for Issues & Advocacy at PDAC.

What the 2013 federal budget means for our sector

BY STEVE VIRTUE

The 2013 Federal Budget—*Canada's Economic Action Plan*—was introduced in late March without the massive cuts everyone anticipated, although fiscal responsibility was definitely the theme of the day with less than $1 billion in new spending.

The majority of new money focused on two main government priorities: 1) getting people back to work and working in the right jobs; and 2) retooling Canada's manufacturing sector while eliminating the federal deficit by 2016. This was, by all historical measures, a very conservative budget that found many stakeholders wincing at unfulfilled requests. As the Honourable Joe Oliver, Minister of Natural Resources, noted in a speech following the budget: "We are still suffering the affects of a fragile international economic situation, and we have to remain focused on jobs and growth."

One of the PDAC's main expectations from the federal government was a renewed commitment to the Mineral Exploration Tax Credit (METC). The budget extended the eligibility for the METC for flow-through share investors for one year to flow-through share agreements entered into, on or before March 31, 2014.

In light of the current financial health of the sector, any measures that keep investment flowing remain of paramount importance. This is a positive step on behalf of the government to ensure that Canadian companies have access to the financial instruments required to remain competitive, particularly given the capital-raising challenges many exploration companies are currently facing. Concerns remain around changes to the Canadian Exploration Expenses (CEE) and the implications for our members. The PDAC will steadfastly continue to work with the federal government to evaluate the impacts.

The Metals Economics Group noted in their 2012 report that junior companies have accounted for close to half of the annual mineral exploration spending in recent years, often shouldering the biggest exploration risks in conducting "greenfield" exploration and scouring the countryside for minerals in many far-flung, hard-to-reach places. The METC already has a proven track record of keeping jobs and investment in Canada and will continue to encourage investment in Canadian exploration projects.

The PDAC also applauds the federal government's budget commitments intended to provide support for skilled trades and post-secondary education. A 2011 report entitled *Unearthing Possibilities* that was conducted by the PDAC and the Mining Industry Human Resources Council (MiHR) identified some of the challenges our industry is facing, especially the need for at least 100,000 new workers to enter the sector by 2020. We support these investments because we believe they will help provide all Canadians with greater choice and opportunity, including numerous career options within the exploration and mining sector. Moreover, investments in skills training will help Canadian companies maintain our competitive advantage and remain a global leader.

While not specifically referenced in the budget, the PDAC is anticipating that the federal government will announce further investments for the vitally important Geo-mapping for Energy and Minerals (GEM) program. This program provides critical geoscience knowledge necessary for exploration to guide investment decisions, as well as for government to inform land-use decisions such as the creation of parks and other protected areas. We'll be closely monitoring this development to ensure that such investments are injected into the program so that our members are able to survive and prosper in these uncertain economic times. c

Steve Virtue is the PDAC's Senior Director of Public Affairs & Communications.

HIGHLIGHTS FROM THE 2013 FEDERAL BUDGET

- $900 million in new spending; no new taxes or tax cuts
- Renewal of the Mineral Exploration Tax Credit (METC)
- Creation of a new Canada Job Grant to train workers
- New 10-year, $14.4 billion infrastructure fund
- $241 million over five years for First Nations skills training
- CIDA wrapped into renamed Foreign Affairs, Trade and Development

THE ENGINE THAT DRIVES CANADA'S MINERAL EXPLORATION AND MINING INDUSTRY

BY VIRGINIA HEFFERNAN

While Canada's mineral exploration and mining business is widely recognized as a global powerhouse, there is less awareness of the financing juggernaut that fuels that success.

Over the past decade, the TMX Group—including the Toronto Stock Exchange (TSX) and the TSX Venture Exchange (TSX-V)—has grown to dominate the worldwide market for mining equities, capturing about 90% of the financings completed worldwide and responsible for about 40% of the capital raised. The total market capitalization of companies listed on the TSX-V alone has almost doubled from $10 billion in 2003 (the first year of full statistics) to $19.3 billion in 2012.

Several of Canada's household mining names, such as Barrick Gold Corporation and Goldcorp Inc., started out as the type of emerging companies that the TSX-V nurtures, using capital on the Toronto market to finance gold discoveries that would eventually transform them into economic powerhouses.

That kind of access to risk capital, combined with a rich mineral endowment and government incentives for exploration in the form of flow-through shares and the super flow-through tax deduction, has made Canada one of the world's top mineral producers and the number one global destination for exploration capital. In 2011, Canadian mineral production value rose 21% to a record $50.3 billion while exploration spending reached $3.9 billion, according to the Mining Association of Canada's (MAC) *Facts & Figures 2012* report.

As a result, the mining sector has become a powerful driver of the TMX Group and was the main target of a proposed merger

between TMX and the London Stock Exchange in 2011 that ultimately failed due to a lack of shareholder support. Of the roughly 3,800 issuers currently listed on the TSX and TSX-V, 44% are miners and explorers accounting for about 20% of the total equity capital raised.

There are several reasons why companies and their investors choose Toronto when they seek participation in the mining space. One is the diversity of issuers, from small explorers to senior producers, and from lithium start-ups to gold miners.

"Our market is quite unique because we have more than 1,600 mining issuers on our exchanges combined. That's almost double what they have on the ASX (Australian Stock Exchange), our closest competitor," says Orlee Wertheim, Mining Head of Business Development for the TMX Group. "There is a lot of diversification in terms of the stage of development, the commodity they are working with, and the project orientation. So investors get exposure to a whole range of companies."

Toronto's two-tier market system, where start-ups can list relatively easily on the TSX-V, then graduate to the more tightly regulated TSX when they reach the development stage, also suits the mineral sector because deposits must be discovered before they can be developed. Of the 451 companies that have graduated to the TSX main board since 1999—the year the venture exchange was first conceived from the amalgamation of Canada's regional exchanges—236 were miners and explorers.

And finally, regulatory tightening following the Bre-X scandal in 1997 gives investors the ability to compare projects on an apples-to-apples basis and the confidence that their money will not be squandered on moose pasture. Designed to prevent the type of fraudulent and/or misleading claims that brought the Bre-X shareholders to their knees, National Instrument 43-101 provides strict guidelines on how information about mineral projects is disclosed to the public.

"A strong regulatory system is something both institutional and retail investors look at," says Wertheim. "The feedback that I've had from investors internationally is that they really do like to be able to compare one company to another. They can look at two separate reports and get the same technical content and subject matter."

Toronto's depth of mining and geological expertise plays a supporting role. With Canada's long tradition of prospecting and education in geology and mining engineering, a legion of legal and financial experts—either retrained geologists and miners or descendants of mining families—inhabits the downtown core.

These unique strengths, combined with the fortune of having abundant mineral resources, make mineral exploration and mining a significant driver of the Canadian economy, according to MAC's recent study. In 2011, the industry contributed $35.6 billion to Canada's GDP and represented 22.8% of the value of Canadian goods exported. Mining and mineral exploration is the largest private sector employer of Aboriginal people in Canada, and mineral extraction, smelting, fabrication and manufacturing employ 320,000 Canadians who enjoy wages significantly higher (32-47%) than their counterparts in forestry, finance or construction.

This incredible amount of activity also greatly benefits the broader Canadian economy. An entire suite of suppliers, for instance, has grown up alongside exploration and mining, giving Canada the world's second largest industry supply sector behind the United States. And taxes and royalties flowing from the industry to the federal, provincial and territorial governments are growing again after a brief lull. In 2011, the industry contributed more than $9 billion to government coffers, an increase of 21% from the year before.

Meanwhile, the industry continues to invest in its future. According to the MAC study, Canadian mining and metals companies spent $590 million on research and development in 2011, more than the motor vehicles and parts sector, as well as the wood products and paper sector. About $140 billion worth of mining-related projects have also been proposed for Canada, including several gold, iron ore, diamond and rare earth projects for Nunavut and the Northwest Territories. Such investments in the industry will go a long way in ensuring that Canada's mineral exploration and mining industry remains a global leader throughout the 21st century and beyond. **c**

Virginia Heffernan is the principal of GeoPen Communications and a science and business writer who specializes in writing about mineral and energy resources.

GREEN technologies that are changing the way we do business

BY ELIZABETH HAMES

THE MAGIC OF ZEOLITE

It sounds like folklore: a stone that can suck harmful metals and chemicals from the soil while returning beneficial nutrients back to the Earth. But the only magical thing about zeolite is its ability to remain virtually unheard of—until now. Zeolite has been used to clean up radioactive soils in Fukushima, Japan, dissolve smog in B.C.'s Fraser Valley, and produce sweeter wines in the Okanagan Valley.

And now, Ray Paquette, CEO of B.C.-based Canadian Mining Company Inc., is trying to convince mining companies to leverage zeolite's unique detoxifying powers to clean up their mine sites. "As far as curing the planet of its ails, it's something that will help in a lot of different areas," he says. Treating effluent at mine sites with zeolite filters, for example, can transform millions of litres of liquid into a few tons of easily-controlled solid waste. Mixed with tailings, the porous stone can also help mitigate the potentially damaging effects of contaminants.

It's just one of the innovative approaches mineral exploration and mining companies are utilizing to do right by the planet and also by their investors. Both public pressure and cost pressures have long pushed the industry to operate more sustainably, and many of the advances made so far have been "modest, but still good things," says John Thompson, President of the Canadian Mining Innovation Council (CMIC). "The last piece of the puzzle is looking at new technologies that are really going to make a difference to the environment."

HAULING WITH HYBRID ENERGY

Consider the sheer amount of rock that must be moved to extract a valuable mineral. Goldcorp's Musselwhite mine in northwestern Ontario, for example, processed 1.3 million tonnes of ore in 2012 to produce 240,000 ounces of gold, according to the company's website. Historically, diesel-hungry vehicles have been the only option for companies looking to haul large loads. But CanmetMINING (CMIN), a division of Natural Resources Canada, has partnered with Sudbury-based Mining Technologies International to develop a hybrid diesel-electric loader that could fulfill mining companies' hauling needs while being gentler on the environment.

All of the loader's parts are powered by electricity. The only function of the diesel engine, which runs at a high-efficiency "sweet spot", is to recharge the battery, explained Michel Grenier, a Senior Scientific Adviser with the division. CMIN says the loaders will cut noxious emissions by as much as 70 per cent, which in turn can reduce the demand on a mine's ventilation system by up to 40 per cent. A significant number considering that ventilation can account for more than a third of a mine's total electricity costs. Hybrid vehicles are only the beginning for CMIN, whose long-term goal is to have fully-electric mobile equipment underground.

NO NEED FOR HELICOPTERS

When it comes to minimizing energy consumption, however, moving rock is only part of the battle. Minerals are not known for being conveniently located next to existing roads, and the Canadian landscape is littered with obstacles that even all-terrain vehicles have difficulty surmounting. So exploration and mining companies have traditionally been reliant on expensive and relatively fuel-inefficient helicopters to get workers and supplies to and from their sites.

But one Quebec company has developed an all-terrain vehicle that can power through mud, snow, bush and water with ease. "The Kaskoo goes over it no problem," says Jean-Paul Allaire, spokesperson for ALL Technologie Inc. "In 10 years from now we are not going to hear the word muskeg anymore." IOS Services Géoscientifiques Inc., one of Quebec's largest exploration firms, has been operating the prototype successfully for a year and has already reduced its use of helicopters.

WARMING UP TO WIND POWER

Remoteness has an additional impact on energy use, as many of Canada's mine sites lie beyond the reach of the electrical grid, making them dependent on generators. A large mine can consume millions of litres of diesel fuel every year in heating, lighting and pumping water from shafts. In 2007, Diavik Diamond Mine in the Northwest Territories began investigating ways of diversifying its power supply. A small-scale wind farm, managers estimated, could reduce the mine's dependency on diesel by five million litres annually.

Unfortunately, there was no wind turbine on the market that could operate in the mine's harsh climate. So the company turned to German manufacturer ENERCON to build a blade de-icing system that could withstand temperatures of -40°C. "A new benchmark for this particular product," says Diavik spokesperson Doug Ashbury.

Since it started generating power in September 2012, the wind farm has survived one of the coldest winters on record and has saved Diavik more than $1 million in fuel costs in only a few months, adds Ashbury. The company estimates that the $32 million project will pay for itself within eight years.

"There's a cost aspect, and of course there's an environmental aspect too," says Ashbury. "We want to do our part to reduce our carbon footprint."

SENSOR STEWARDSHIP THAT REDUCES WASTE

Energy efficiency is not the only path to a smaller environmental footprint. In fact, according to CMIC President John Thompson, the best change that mining companies can make is to produce fewer tailings by mining less material. "That would be the end game," he says.

Fortunately for miners, a Vancouver-based company has developed technology to allow them to do just that. MineSense's high-frequency electromagnetic sensor (HFEMS) technology measures the grade of ore in the ground, allowing miners to be pickier about what and how much ore they process and throw away. By adopting HFEMS, the company says, miners can reduce their production of waste by as much as 60 per cent, and energy usage by as much as 16 per cent, for an overall cost savings of between 15 and 30 per cent.

These numbers have already proven popular with major mining companies. "Early adopters of MineSense technologies include BHP, Xstrata and Vale, as well as a number of junior mining companies including Canadian Arrow Mines and Anfield Nickel," says Dr. Andrew Bamber, CEO of MineSense.

Although the industry has made great inroads so far, Thompson says exploration and mining companies will never stop pushing to become more efficient. "You're just going to see year on year people are always going to be squeezing, squeezing, squeezing to get it better, to do it better," says Thompson. "Both because that's good for business, but also because it's good for sustainability." **c**

Elizabeth Hames is a Vancouver-based freelance journalist and a consulting writer with Hassard Fay.

A small-scale wind farm, managers estimated, could reduce the mine's dependency on diesel by ***5 MILLION*** *litres annually*

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